9

Longevity of Fishes in Captivity, as of September, 1956[1]

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FISHES are often credited with the attainment of tremendous age. Pliny, for example, attributed a normal life-span of 90 years to "Esox," probably the freshwater pike. Gesner, in his *Icones,* told of a pike 267 years old, and Baldinger (*ca.* 1802) mentioned one that died in its 277th year. It is well known that we can place little credence in figures such as these. As Frank Buckland wrote in 1880, "From the days of Gesner downwards, more lies—to put it in very plain language—have been told about the pike than any other fish in the world; and the greater the improbability of the story, the more particularly is it sure to be quoted" (Trautman & Hubbs, 1936). The skeleton of a supposedly 276-year-old pike, which had long resided in a museum, was found to consist of bones assembled from several individual fish (Breland, 1952), which, to say the least, throws doubt upon its authenticity. Furthermore, the abode of this pike had been a natural lake, in an area where this species is abundant, and it is not likely that positive identification of the same individual could have been made throughout the years. The same may be said of the various long-lived carp described by several authors (*e.g.* Suffield, 1874); it is probable that each of these records represents not a single fish, but a succession of individuals. Carp have been credited with life-spans ranging up to 375 years (Mehwald, 1872).

Nevertheless, figures for extreme longevity in fishes have been widely accepted, and they have helped to bring about the belief that fishes do not suffer senescence, but instead continue in the growing vigor of youth until their lives are cut short by accident (Brown, 1957). There is, of course, abundant evidence to the contrary. Rasquin & Hafter (1951) and Gerking (1959), for example, showed that senility changes in at least some teleosts conform to the usual vertebrate pattern. Comfort (1956) discussed symptoms of "old age" in *Carassius auratus* and *Abramis brama.* Many small fishes, of the kinds usually kept in the home aquarium, become senile in a few months or years. Certain large fishes, on the other hand, such as the true halibuts (*Hippoglossus hippoglossus* and *H. stenolepis*), appear to reach an equilibrium in which they keep growing indefinitely at a low but nearly uniform increment *per annum* (Carl L. Hubbs, personal communication).

A number of techniques have been evolved by means of which the age of a fish may be determined, but most of these are applicable only to the first few years of life and have little value in the determination of the maximum age of a species. Length-frequency methods work very well until the age of maximum growth rate has passed, after which year classes are scarcely distinguishable. Counts of scale rings are accurate for a greater portion of the life span, but the rings tend to become obscured as the growth rate slows down. Gandolfi-Hornyold (1935) examined the scales of a European eel, *Anguilla anguilla,* that had lived for 24 years in the Aquarium at the Hydrobiological Institute of Toulouse; he could count only 11 growth rings. This discrepancy might be explained as the result of the specimen's having lived in a stable environment, without normal seasonal changes of temperature and food supply, but other observations indicate that eels may stop growing and stop forming growth marks on the scales. American eels, *Anguilla rostrata,* known to have been confined for a half-century in certain lakes of southern Michigan, were determined by Carl L. Hubbs, who was then Director of the Institute for Fisheries Re-

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search at the University of Michigan, to be of normal adult size and to have only about 11 year marks on their scales (Hubbs, personal communciation). The scales of a European eel that lived in captivity for 57 years according to Macleod (1949), were apparently not studied.

The otolith method is more accurate than the scale method for some cases—especially when thin otolith sections are examined microscopically — but this method, too, is most useful in studying the important early growth years.

The method of direct observation, though fraught with inaccuracy, and limited severely in its applicability to animals under natural conditions, seems to be the least equivocal manner of determining the maximum age attained by fishes. A number of lists of such observations have been published, some of them setting forth the records of longevity as observed in a particular aquarium. Notable among these are the articles by Director Charles Haskins Townsend, Secretary Ida M. Mellen (1918) and Pathologist Ross F. Nigrelli, all of the New York Aquarium. Flower (1925, 1935) listed the records available to him; a few were the result of scale ring studies or other methods of estimating age, but the majority were based on direct observation. Some of the latter concern fishes that were observed in their natural environments, but most refer to aquarium specimens. Bourlière (1946) used Flower's data, plus a few additional figures, in a discussion of average age as compared to maximum age in 56 species of fishes.

In spite of these excellent lists, conversations and correspondence with aquarium curators led the author of the present paper to the realization that a number of unpublished records were in existence, and accordingly a program was undertaken to gather as many as possible for convenient reference. It is hoped that this list of records may be kept up to date, and revised at appropriate intervals—much in the manner of the annual list of records of snake longevity begun by Perkins (1947) and continued by Shaw (1958).

It was decided to limit records to those observations made in aquariums, excluding data from observations made in natural bodies of water, even though some of the latter are probably perfectly valid (see, for example, Gandolfi-Hornyold, 1935). It was also decided to exclude those species having a captive life span of less than five years. Information on the shorter-lived species would without doubt be extremely interesting, but its compilation would have been a tremendous task. Questionnaires were sent to 56 public aquariums in many parts of the world, requesting information on the longest-lived specimen of every fish known to have lived in captivity for five or more years. Nineteen replies were received, containing information on 238 species. To these have been added appropriate non-duplicated items from Flower (1925, 1935), Simpson (1957) and Nigrelli (1959).

The Aquarium of the Royal Zoological Society, Amsterdam, Holland, listed the largest number of species: 95. The same aquarium also reported the longest-lived fish—a sturgeon, *Acipenser ruthenus*, whose life span fell just four months short of 70 years.

There were more reports for cyprinids than for any other family—36 species in all. The oldest cyprinid is a carp, reported by the Frankfurt-am-Main Aquarium as having lived there for 38 years. Carp were listed by ten aquariums, more than for any other species, and the average maximum age was well over 19 years. Next most numerously represented is the Family Characidae, with 35 species. The oldest characin is a piranha, *Serrassalmus niger*, still living in Chicago's John G. Shedd Aquarium after 21 years and 4 months. Third is the Family Serranidae, with 25 or 26 species (one listing is simply *Epinephalus* sp.). The oldest individuals are the 30-year-old *Dicentrarchus labrax* of the Amsterdam Aquarium and several groupers of the genus *Epinephalus*, reported by A. W. C. Herre (in a letter to Earl S. Herald) as having lived in the Manila Aquarium for at least 30 years.

Several families are remarkable for the long lives of their members. Fifteen specimens of acipenserids are reported, for example, with an average captive life of 19 years and 6 months; this includes the figures for *Acipenser sturio*, which has apparently been relatively short-lived in captivity, with a record of less than 7 years. *Acipenser ruthenus*, on the other hand, was reported 6 times, and its captive life has averaged 31 years and 6 months.

The lepisosteids comprise another hardy group; the report lists 17 individuals, whose ages average 17 years and 7 months. The average captive life span of the 34 individuals of the Serranidae is 8 years and 10 months; only 6 of these, however, lived for longer than 10 years, and the median age of the records for the family lies between 7 and 8 years. This, incidentally, was one of the reasons for deciding upon the 5-year minimum for this report, instead of reducing the list by drawing the line at 10 years, as Perkins and Shaw have done with their snake records; a 10-year minimum would have resulted in the virtual exclusion of the serranids.

Muraenids have done well in captivity; 6 specimens of more than 20 years' residence were

reported by various aquariums. This does not compare favorably, however, with the legends telling of morays kept by Roman emperors through several generations. Perhaps such a long life presupposes a steady diet of Christians.

It will be noted that members of the family Esocidae are reported only three times and that the maximum age reported for any pike is only 10 years, the average being 8 years and 6 months. This makes it even more nearly certain that the old stories of bicentennarian pike are, to put it charitably, exaggerated.

It should be pointed out that some of the non-anadromous salmonids appear to be quite long-lived, and that there are hatchery records that far exceed the ones from aquariums listed here. For example, Leach (1924) states that female rainbow trout have been kept and regularly stripped for as long as 14 years, and there is a record of two lake trout that lived for 23 and 24 years in the Shasta hatchery operated by the California Division of Fish and Game (Anon., 1949).

Mullets (Mugilidae) are represented on the list by 5 species, one of which (*Liza chelo*) resided for 23 years in the aquarium of the Marine Biological Association of the United Kingdom in Plymouth. This was a surprise to the author, whose experience with the one species of *Mugil* occurring in southern California has been that it is a delicate fish, rarely living for more than a few months. California's single species of mullet is referred to the supposedly cosmopolitan *Mugil cephalus,* which is reported as having lived for 9 years in the aquarium at the Hellenic Hydrobiological Institute at the Station of Rhodes in the Dodecanese Islands. This difference may, of course, result from better equipment or better aquariological technique, or it may reflect some basic physiological difference between stocks from different regions.

Many fishes are known to adapt well to captivity, in that they show a low initial mortality after capture, but appear nonetheless to have a naturally short life expectancy. Aquarists find, for example, that as a rule most members of the family Blenniidae adapt easily to the conditions of captivity, and yet the family is represented on this list by a single report—a specimen of *Blennius pholis* that lived for 5 years in the Danmarks Akvarium in Charlottenlund, Denmark. Such regular aquarium inhabitants as the cyprinodonts, gobiids, clinids, and cottids are not reported at all, and it is tempting to infer that their natural life spans fall short of five years.

Also obviously absent from the list are most of the fast-moving pelagic fishes of many families, including the Coryphaenidae, Thunnidae, Istiophoridae and Xiphiidae. This is undoubtedly due, in some groups, to an inability to adapt to captivity, but in others—perhaps in most—it is again a question of a short span of life. Sailfish, for instance, very rarely reach the age of 5 years in the natural state (DeSylva, 1957), and F. G. Wood, Jr., of the Marine Studios, Marineland, Florida, has found that the life span of the dolphin (*Coryphaena hippurus*) may be even shorter (personal communication). Several investigators are finding the tunas to be short-lived.

Elasmobranch fishes are reported only 20 times. The oldest of these is a nurse shark (*Ginglymostoma*) reported as still living in the John G. Shedd Aquarium after 24 years.

The original request for information did not ask specifically for data concerning the manner of death, although this question will be included in future polls. Where such information was volunteered, it appeared that accident plays an important role even within the sheltered confines of a well-managed aquarium, and that every aquarist has suffered his share of catastrophes. Few of us, however, have had the misfortune to face wartime disasters such as those that brought about 100% fatalities in Munich, Bremerhaven and Manila. Douglas P. Wilson of Plymouth wrote that his old *Dicentrarchus labrax* died when vandals crept in through the aquarium's bomb-shattered windows and drained several of the tanks.

In the following list only the oldest record for each species is noted. The second column (A) shows the number of aquariums in which each species is reported to have lived for five or more years, while the third column (B) gives an abbreviation representing the home of the oldest listed individual. The last column (C) tells the age of this specimen in years and months; an asterisk (*) indicates that the specimen was still living when the report was first received by the author (in 1956). The sequence of families is that of Berg (1940).

Acknowledgments

Thanks are due the aquarists all over the world who took time from their busy schedules to furnish this information. Dr. James A. Böhlke of the Academy of Natural Sciences of Philadelphia helped by supplying information in the taxonomy of the Characidae, Cichlidae, and Channidae. Special thanks are due Dr. Carl L. Hubbs of the Scripps Institution of Oceanography, University of California, San Diego, who undertook to bring the nomenclature into a consistent

scheme and to re-group synonymies. Unfortunately, circumstances beyond his control conspired to keep Dr. Hubbs from going over the list as thoroughly as would have been desirable, and any errors that remain must be attributed to the author.

Abbreviations

Abbreviations used in the Table below are as follows:

AMS—Aquarium of the Royal Zoological Society, Amsterdam, Holland.

BREM — Tiergrotten und Nordsee-Aquarium, Bremerhaven, Germany.

CHAR—Danmarks Akvarium, Charlottenlund, Denmark.

CHI—John G. Shedd Aquarium, Chicago, Illinois.

DAL—Dallas Aquarium, Dallas, Texas.

(F)—Following the abbreviation of an aquarium, refers to a report made by Flower (1925 or 1935).

FLOW — Refers to Flower (1925 or 1935), where the location of the specimen is not certain.

FRANK—Frankfurt-am-Main Zoological Garden, Frankfurt, Germany.

GIZ—Giza Zoological Gardens, Giza, Egypt.

HERM — Ocean Aquarium, Hermosa Beach, California.

LON—The London Aquarium, London, England.

MON—Institut Océanographique, Monaco.

MUN — Tierpark Hellabrunn, Munich, Germany.

NY — New York Aquarium, New York, New York.

NZ — Wellington Aquarium, Wellington, New Zealand.

PHIL—Fairmount Park Aquarium, Philadelphia, Pennsylvania.

PLY — Marine Biological Association of the United Kingdom, Plymouth Laboratories, Plymouth, England.

RHO—Athens Academy, Hellenic Hydrobiological Institute, Station of Rhodes, Dodecanese Islands, Greece.

SF—Steinhart Aquarium, San Francisco, California.

SIO—T. Wayland Vaughan Aquarium-Museum, Scripps Institution of Oceanography, University of California, San Diego.

SHA—Shasta Trout Hatchery, Mt. Shasta, California.

TOL—Toledo Zoo Aquarium, Toledo, Ohio.

WUP — Zoologischer Garten, Wuppertal, Germany.

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Column A—Number of aquariums reporting given species.

Column B—Aquarium reporting the oldest specimen.

Column C—Age of the oldest specimen (years/months).

* Indicates that the specimen was living as of September, 1956.

Family and Species	A	B	C
Heterodontidae—Horned Sharks			
Heterodontus francisci (Girard)	1	SIO	12/3
Orolectolobidae—Nurse Sharks			
Ginglymostoma cirratum (Bonnaterre)	1	CHI	24*
Carchariidae—Sand Sharks			
Carcharias taurus Rafinesque	2	NY	9
Scylliorhinidae—Cat Sharks			
Scylliorhinus canicula (Linnaeus)	4	LON(F)	8/4
S. stellaris (Linnaeus)	2	AMS	19/4
Triakidae—Smooth Dogfishes			
Triakis semifasciata Girard	1	HERM	6
Pristidae—Sawfishes			
Pristis pectinatus Latham	1	CHI	8/1
Rajidae—Skates			
Raja clavata Linnaeus	4	CHAR	14/7
R. maculata Montagu	1	LON(F)	5/7
R. punctata Risso	1	RHO	6/10

LONGEVITY OF FISHES IN CAPTIVITY AS OF SEPTEMBER, 1956 (Continued)
(Limited to reported life of five years or more.)

FAMILY AND SPECIES	A	B	C
DASYATIDAE—Stingrays			
Dasyatis pastinaca (Linnaeus)	2	LON(F)	21
TORPEDINIDAE—Electric Rays			
Torpedo marmorata (Linnaeus)	1	RHO	6/10
CERATODONTIDAE—Australian Lungfish			
Neoceratodus forsteri (Günther)	3	CHI	22/4*
LEPIDOSIRENIDAE—South American Lungfish			
Lepidosiren paradoxus Fitzinger	1	AMS	9/8
PROTOPTERIDAE—African Lungfishes			
Protopterus aethiopicus Heckel	2	LON(F)	6/10
P. annectens Owen	4	NY	23*
P. dolloi Boulenger	1	LON(F)	8/8
POLYPTERIDAE—Bichirs			
Polypterus senegalis Cuvier	1	GIZ(F)	34
ACIPENSERIDAE—Sturgeons			
Acipenser brevirostrum Le Sueur	1	NY	7
A. fulvescens Rafinesque	3	CHI	23/3
A. ruthenus Linnaeus	6	AMS	69/8
A. sturio Linnaeus	4	AMS	9/11
Scaphyrhynchus platorhynchus (Rafinesque)	1	DAL	13*
POLYODONTIDAE—Paddlefishes			
Polyodon spathula (Walbaum)	1	CHI	5/2
AMIIDAE—Bowfins			
Amia calva Linnaeus	3	NY	30
LEPISOSTEIDAE—Gars			
Lepisosteus osseus (Linnaeus)	6	NY	30
L. platostomus Rafinesque	5	NY	20
L. productus (Cope)	1	TOL	8/3
L. spatula Lacépède	5	CHI	23/4*
MEGALOPIDAE—Tarpons			
Tarpon atlanticus (Valenciennes)	2	CHI	19/10*
SALMONIDAE—Trouts			
Coregonus clupeaformis (Mitchill)	2	NY	12
Hucho hucho (Linnaeus)	1	MUN	10
Salmo gairdnerii Richardson	1	NY	5
S. trutta fario Linnaeus	1	NY	5
S. trutta lacustris Linnaeus	1	LON(F)	10/4
Salvelinus fontinalis (Mitchill)	1	NY	5
S. malma (Walbaum)	1	SHA	19
ESOCIDAE—Pikes			
Esox lucius Linnaeus	2	LON(F)	10
E. masquinongy Mitchill	1	NY	10
NOTOPTERIDAE—Notopterids			
Notopterus notopterus (Pallas)	1	AMS	9/4
OSTEOGLOSSIDAE—Osteoglossids			
Osteoglossum bicirrhosum Vandelli	1	CHI	6/3
PANTODONTIDAE—Pantodon			
Pantodon bucholzi Peters	2	AMS	6/9
MORMYRIDAE—Mormyrids			
Marcusenius isidori Valenciennes	1	FLOW	28/11
Mormyrus kannume Forskål	1	CHAR	16/3
CHARACIDAE—Characins			
Astyanax bimaculatus (Linnaeus)	1	AMS	18
A. fasciatus mexicanus (Filippi)	1	LON(F)	6/9
Chalceus macrolepidotus Cuvier	2	MUN	19*
Colossoma nigripinnis (Cope)	1	MUN	6*
Copeina guttata (Steindachner)	1	AMS	6/6
Corynopoma riisei Gill	1	AMS	13
Ctenobrycon spilurus (Valenciennes)	2	AMS	14/7
Exodon paradoxus Müller & Troschel	1	CHAR	6/8

LONGEVITY OF FISHES IN CAPTIVITY AS OF SEPTEMBER, 1956 (Continued)
(Limited to reported life of five years or more.)

FAMILY AND SPECIES	A	B	C
Gymnocorymbus ternetzi (Boulenger)	2	AMS	8/2
Hemigrammus caudovittatus Ahl	1	AMS	12/2
H. ocellifer (Steindachner)	1	NZ	5
H. uniliniatus Gill	1	LON(F)	5/2
Hemiodus semitaeniatus Kner	2	CHI	16/1
Hepsetus odeo (Bloch)	1	MUN	6*
Hyphessobrycon bifasciatus Ellis	1	AMS	9
Leporinus fasciatus (Bloch)	3	MUN	18
L. friderici Bloch	3	MUN	18
L. megalepis Günther	2	CHAR	18/1
Metynnis maculatus (Kner)	1	LON(F)	11/11
M. roosevelti Eigenmann	3	MUN	17/6*
M. schreitmuelleri Ahl	1	WUP	6/4*
Moenkhausia oligolepis (Günther)	1	AMS	14/6
Myleus asterias (Müller & Troschel)	3	MUN	18*
M. gurupyensis Steindachner	1	MUN	18*
M. schomburgkii (Jardine)	1	MUN	18*
Mylossoma duriventre (Cuvier)	2	MUN	18*
Nannaethiops unitaeniatus Günther	1	AMS	6/2
Pristella riddlei (Meek)	1	AMS	9/2
Prochilodus insignis Schomburgk	2	WUP	6/10*
Serrasalmus nattereri (Kner)	2	MUN	17
Serrasalmus niger (Schomburgk)	1	CHI	21/4*
S. rhombeus (Linnaeus)	1	TOL	19
S. spilopleura Kner	1	CHAR	7/9
Thoracocharax stellatus (Kner)	1	CHAR	9/5
ELECTROPHORIDAE—Electric Eel			
Electrophorus electricus (Linnaeus)	3	AMS	12/1
CATOSTOMIDAE—Suckers			
Ictiobus bubalus (Rafinesque)	1	TOL	16/4
Ictiobus cyprinella (Valenciennes)	1	TOL	16/4
CYPRINIDAE—Minnows			
Abramis brama (Linnaeus)	2	AMS	15/9
Aphyocypris pooni Lin	1	AMS	7/8
Balantocheilus melanopterus Bleeker	1	AMS	11/11
Blicca bjoerkna (Linnaeus)	1	AMS	16/10
Brachydanio albolineatus (Blyth)	1	AMS	7/6
B. nigrofasciatus (Day)	1	AMS	7/1
B. rerio (Hamilton-Buchanan)	1	AMS	8
Carassius auratus (Linnaeus)	7	NY	10
Cyclocheilichthys apogon (Valenciennes)	1	AMS	6/2
Cyprinus carpio Linnaeus	10	FRANK	38
Danio malabaricus (Jerdon)	1	AMS	7/10
Epalzeorhynchus kalopterus (Bleeker)	1	CHAR	12
Leuciscus cephalus (Linnaeus)	2	AMS	7
L. idus (Linnaeus)	3	AMS	21/7
Notemigonus crysoleucas crysoleucas (Mitchill)	1	NY	7
Osteocheilus hasseltii (Valenciennes)	1	MUN	18
O. vittatus (Valenciennes)	1	MUN	6
Puntius chola (Hamilton-Buchanan)	1	AMS	11/4
P. cumingi (Günther)	1	AMS	6/5
P. dunkeri (Ahl)	1	MUN	11
P. everetti (Boulenger)	2	MUN	11
P. lateristriga (Valenciennes)	2	AMS	18/5
P. nigrofasciatus (Günther)	1	AMS	7
P. oligolepis (Bleeker)	1	AMS	8/1
P. schwanfeldi (Bleeker)	1	AMS	11/3
P. semifasciolatus (Günther)	1	AMS	18/8
P. ticto (Hamilton-Buchanan)	1	AMS	12/10
P. titteya Deraniyagala	1	AMS	6/7

LONGEVITY OF FISHES IN CAPTIVITY AS OF SEPTEMBER, 1956 (Continued)
(Limited to reported life of five years or more.)

FAMILY AND SPECIES	A	B	C
Rasbora einthovenii (Bleeker)	1	AMS	10/11
R. heteromorpha Duncker	2	LON(F)	6/9
R. trilineata Steindachner	1	AMS	6/10
Rhodeus sericeus (Pallas)	2	AMS	10
Rhinichthys atratulus atratulus (Hermann)	1	NY	5
Rutilus rutilus (Linnaeus)	1	AMS	9/3
Scardinius erythrophthalmus (Linnaeus)	5	CHI	20/3*
Tinca tinca (Linnaeus)	1	CHAR	7/11
COBITIDAE—Loaches			
Botia hymenophysa (Bleeker)	1	AMS	6
Cobitis taenia Linnaeus	2	FLOW	10/1
Nemacheilus barbatulus (Linnaeus)	1	AMS	8/3
ARIIDAE—Sea Catfishes			
Galeichthys felis (Linnaeus)	2	PHIL	15/3*
DORADIDAE—Doradid Catfishes			
Doras sp.	1	AMS	26/5
SILURIDAE—Sheatfishes			
Silurus glanis Linnaeus	3	CHAR	11/6
ICTALURIDAE—North American Catfishes			
Ictalurus nebulosus (Le Sueur)	1	AMS	13/6
I. punctatus (Rafinesque)	2	TOL	8/5
Pylodictis olivaris (Rafinesque)	2	TOL	16/1
CHACIDAE—Chacid Catfishes			
Chaca chaca (Hamilton-Buchanan)	1	AMS	6/4
SACCOBRANCHIDAE—Airbreathing Catfish			
Saccobranchus fossilis (Bloch)	4	AMS	12/11
CLARIIDAE—Clariid Catfishes			
Clarius batrachus Valenciennes	2	AMS	13/2
SYNODONTIDAE—Upside-down Catfishes			
Synodontis schal (Bloch & Schneider)	2	FLOW	31
MALAPTERURIDAE—Electric Catfish			
Malapterurus electricus (Linnaeus)	5	CHI	8/1
PIMELODIDAE—South American Catfishes			
Phractocephalus hemeliotropus (Bloch & Schneider)	1	CHI	12/2
Pimelodella gracilis (Valenciennes)	2	AMS	11/11
Pimelodus clarias (Bloch)	1	AMS	27/1
Rhamdia sebae (Valenciennes)	2	AMS	30/8
CALLICHTHYIDAE—Mailed Catfishes			
Corydoras aeneus Gill	2	MUN	12
C. julii Steindachner	1	WUP	6/5
LORICARIIDAE—Armored Catfishes			
Loricaria microlepidogaster Regan	1	AMS	7/7
Plecostomus commersonii (Valenciennes)	3	MUN	19/7
P. punctatus (Valenciennes)	2	MUN	18
P. rachovii Regan	1	MUN	18
ANGUILLIDAE—Freshwater Eels			
Anguilla anguilla (Linnaeus)	6	MUN	19
A. rostrata (Le Sueur)	2	DAL	17*
MURAENIDAE—Morays			
Gymnothorax funebris Ranzani	2	CHI	20/4*
G. mordax Ayres	3	SIO	26
Muraena clepsydra Gilbert	1	SIO	6*
M. helma Linnaeus	4	AMS	20/3
CONGRIDAE—Congers			
Conger conger (Linnaeus)	2	RHO	9*
GADIDAE—Cods			
Lota lota lacustris (Walbaum)	1	NY	5
Pollachius pollachius (Linnaeus)	1	PLY	5
CYPRINODONTIDAE—Killifishes			
Aplocheilus lineatus (Valenciennes)	1	AMS	7/7

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FAMILY AND SPECIES	A	B	C
Epiplatys chaperi (Sauvage)	1	AMS	9/10
POECILIIDAE—Livebearers			
Limia nigrofasciata (Regan)	1	AMS	5/7
ZEIDAE—Dories			
Zeus faber Linnaeus	1	PLY	5
MUGILIDAE—Mullets			
Liza auratus Risso	1	RHO	9
L. capito Cuvier	2	AMS	14
L. chelo Cuvier	2	PLY	23
Mugil cephalus Linnaeus	2	RHO	9
M. rammelsbergii Tschudi	1	AMS	14
ATHERINIDAE—Silversides			
Melanotaenia maccullochi Ogilby	1	AMS	7/7
M. nigrans (Richardson)	1	AMS	17/7
CHANNIDAE—Snakeheads			
Channa striata Bloch	1	AMS	5/10
Ophicephalus obscurus Günther	1	CHAR	11/7
LATIDAE—Nile Perches			
Lates niloticus (Gmelin)	1	FLOW	12
SERRANIDAE—Basses			
Centropristis striatus (Linnaeus)	1	PHIL	5
Dicentrarchus labrax (Linnaeus)	4	AMS	30
Epinephalus aeneus (Geoffroy)	1	RHO	8/5*
E. adscensionis (Osbeck)	1	PHIL	6/11
E. analogus Gill	1	SIO	5*
E. chrysotaenia Doderlein	1	RHO	8/4
E. gigas (Brünnich)	2	MON	29/2
E. guaza (Lacépède)	1	RHO	9/1*
E. guttatus (Linnaeus)	3	PHIL	14/10*
E. itajara (Lichtenstein)	1	NY	12
E. labriformis (Jenyns)	1	SIO	5*
E. morio (Valenciennes)	1	NY	7
E. sp.	1	MON	7/1
E. striatus (Bloch)	3	PHIL	9/1
E. summana Forskål	1	CHAR	8
Morone americana (Gmelin)	1	NY	7
Mycteroperca bonaci (Poey)	1	PHIL	7/11
M. tigris (Valenciennes)	1	NY	5
M. venenosa (Linnaeus)	1	NY	5
Paralabrax clathratus (Girard)	2	SIO	12
P. maculatofasciatus (Steindachner)	1	SIO	8*
P. nebulifer (Girard)	1	SIO	8*
Roccus chrysops (Rafinesque)	1	DAL	6
R. saxatilis (Walbaum)	3	NY	24
Serranus cabrilla (Linnaeus)	1	RHO	7/5
S. scriba (Linnaeus)	1	RHO	7/5
THERAPONIDAE—Theraponids			
Therapon jarbua (Forskål)	1	LON(F)	7/7
KUHLIIDAE—Kuhliids			
Kuhlia taeniura (Cuvier)	1	AMS	8/9
K. sandvicensis (Steindachner)	1	SF	7*
CENTRARCHIDAE—Sunfishes			
Ambloplites rupestris rupestris (Rafinesque)	2	NY	18
Centrarchus macropterus (Lacépède)	2	AMS	16/9
Enneacanthus chaetodon (Baird)	1	AMS	7/1
E. gloriosus (Holbrook)	1	AMS	11
Lepomis gibbosus (Linnaeus)	3	AMS	16
L. megalotis (Rafinesque)	1	LON(F)	6/4
Micropterus dolomieui Lacépède	2	NY	11
M. salmoides salmoides (Lacépède)	3	TOL	13/5

LONGEVITY OF FISHES IN CAPTIVITY AS OF SEPTEMBER, 1956 (Continued)
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FAMILY AND SPECIES	A	B	C
Pomoxis nigromaculatus (Le Sueur)	1	NY	12
PERCIDAE—Perches			
Perca flavescens (Mitchill)	1	NY	12
P. fluviatilis Linnaeus	2	LON(F)	10/8
Stizostedion lucioperca (Linnaeus)	2	LON(F)	9/1
CARANGIDAE—Jacks			
Caranx crysos (Mitchill)	1	PHIL	5/11
C. hippos (Linnaeus)	1	NY	5
Selene vomer (Linnaeus)	1	NY	5
LUTJANIDAE—Snappers			
Lutjanus jocu (Bloch & Schneider)	2	NY	14/7
L. griseus (Linnaeus)	1	NY	7
L. synagris (Linnaeus)	1	NY	7
L. argentiventris (Peters)	1	SF	11*
POMADASYIDAE—Grunts			
Anisotremus davidsonii (Steindachner)	2	SF	9*
Haemulon sciurus (Shaw)	1	NY	5
Orthopristis chrysopterus (Linnaeus)	1	PHIL	5/6
SCIAENIDAE—Croakers			
Aplodonotus grunniens Rafinesque	1	TOL	16/5
Corvina nigra (Bloch)	1	MON	11/11
Cynoscion regalis (Bloch & Schneider)	1	NY	5
C. xanthulus Jordan & Gilbert	1	SIO	5/2
Micropogon undulatus Linnaeus	1	PHIL	6/2
Pogonias cromis (Linnaeus)	2	PHIL	10/9
Roncador stearnsi (Steindachner)	2	HERM	6
Umbrina roncador Jordan & Gilbert	2	SF	6
Sciaenops ocellata (Linnaeus)	2	PHIL	12/1
SPARIDAE—Porgies			
Archosargus probatocephalus (Walbaum)	1	NY	6
Dentex dentex (Linnaeus)	2	RHO	8
Diplodus annularis (Linnaeus)	2	RHO	9
D. sargus (Linnaeus)	2	RHO	9
Oblada melanura (Linnaeus)	1	RHO	9
Pagellus centrodontus (de la Roche)	1	PLY	7
P. mormyrus (Linnaeus)	1	RHO	9
P. pagrus (Linnaeus)	2	RHO	7
Puntazzo puntazzo (Cetti)	1	RHO	9
Sparus auratus Linnaeus	2	RHO	8
Spondyliosoma cantharus (Linnaeus)	3	MON	8
MONODACTYLIDAE—Monodactylids			
Monodactylus argenteus (Linnaeus)	2	MUN	5/6
TOXOTIDAE—Archerfishes			
Toxotes jaculatrix (Pallas)	2	SF	6/5*
SCORPIDAE—Halfmoons			
Medialuna californiensis (Steindachner)	1	HERM	6
GIRELLIDAE—Nibblers			
Girella nigricans (Ayres)	2	HERM	7
EPHIPPIDAE—Spadefishes			
Chaetodipterus faber (Broussonet)	1	NY	5
Platax orbicularis (Forskål)	2	MON	7
P. teira (Forskål)	1	AMS	6/5
SCATOPHAGIDAE—Scats			
Scatophagus argus (Linnaeus)	3	CHAR	9/3
CHAETODONTIDAE—Butterflyfishes			
Holacanthus isabelita (Jordan & Rutter)	1	NY	5
NANDIDAE—Nandids			
Badis badis (Buchanan-Hamilton)	1	AMS	7/6
Pristolepis grooti (Bleeker)	1	AMS	8/1

LONGEVITY OF FISHES IN CAPTIVITY AS OF SEPTEMBER, 1956 (Continued)
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FAMILY AND SPECIES	A	B	C.
CICHLIDAE—Cichlids			
Astronotus ocellatus (Cuvier)	4	WUP	17/3
Aequidens pulcher (Gill)	1	AMS	5/3
Cichlasoma bimaculatum (Linnaeus)	1	AMS	11/10*
C. biocellatum Regan	1	AMS	6/10
C. facetum (Jenyns)	1	AMS	10/4
C. hellabrunni Ladiges	2	WUP	9/4
C. maculicauda Regan	1	AMS	8/11
C. nigrofasciatum (Günther)	1	LON(F)	9
C. severum (Heckel)	3	AMS	10/8
Hemichromis bimaculatus Gill	1	AMS	14/6
Herichthys cyanoguttatus carpintis (Jordan & Snyder)	1	LON(F)	5/6
Pterophyllum eimekei Ahl	2	AMS	5/4
Symphysodon discus Heckel	1	WUP	5/4*
Tilapia macrocephala (Bleeker)	1	AMS	8/6
T. mossambica (Peters)	1	NY	6
T. natalensis (Weber)	1	AMS	12/7
T. nilotica (Linnaeus)	1	AMS	11/11
T. zilli (Gervais)	1	CHAR	5/1
POMACENTRIDAE—Damselfishes			
Amphiprion ephippium (Bloch)	1	CHAR	16/6
Chromis chromis (Linnaeus)	1	RHO	6/6
Dascyllus aruanus (Linnaeus)	1	CHAR	5/11
Hypsipops rubicunda (Girard)	1	SIO	7
Premnas biaculeatus (Bloch)	1	CHAR	8/11
LABRIDAE—Wrasses			
Coris julis (Linnaeus)	1	RHO	7
Pimelometopon pulchrum (Ayres)	3	SF	23
Labrus bergylta Ascanius	1	PLY	5
L. festivus Risso	1	RHO	8
Tautoga onitis (Linnaeus)	2	NY	8
SCARIDAE—Parrotfishes			
Scarus cretensis (Bloch)	1	RHO	7
BLENNIIDAE—Blennies			
Blennius pholis Linnaeus	1	CHAR	5
SIGANIDAE—Siganids			
Siganus chrysospilos (Bleeker)	1	AMS	7/5
ANABANTIDAE—Climbing Perches			
Anabas testudineus (Bloch)	5	DAL	16
Belontia signata (Günther)	2	LON(F)	10/7
Colisa lalia Hamilton-Buchanan	1	AMS	6/11
Ctenops vittatus (Valenciennes)	1	AMS	6/11
Osphrenemus goramy Lacépède	1	AMS	8/11
Polyacanthus hasselti Valenciennes	1	AMS	10/10
Trichogaster leerii (Bleeker)	1	AMS	5/8
ELEOTRIDAE—Sleepers			
Dormitator maculatus (Bloch)	1	AMS	14/2
Eleotris vittata Duméril	1	CHAR	11/10
Oxyeleotris marmorata (Bleeker)	1	AMS	20/5*
SCORPAENIDAE—Scorpionfishes			
Pterois volitans (Linnaeus)	1	MON	10/4
Scorpaena guttata guttata Girard	1	SIO	10
S. porcus Linnaeus	2	RHO	9
S. scrofa Linnaeus	1	RHO	8
TRIGLIDAE—Gurnards			
Trigla lucerna Linnaeus	3	LON(F)	6/9
SCOPHTHALMIDAE—Turbots			
Psetta maxima (Linnaeus)	2	AMS	10/1
BOTHIDAE—Lefteyed Flounders			
Zeugopterus punctatus (Bloch)	1	CHAR	5/5

LONGEVITY OF FISHES IN CAPTIVITY AS OF SEPTEMBER, 1956 (Continued)
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FAMILY AND SPECIES	A	B	C.
PLEURONECTIDAE—Righteyed Flounders			
Platichthys flesus (Linnaeus)	1	RHO	5/2
SOLEIDAE—Soles			
Solea solea (Linnaeus)	2	RHO	5/5
MASTACEMBELIDAE—Mastacembelids			
Mastacembelus erythrotaenia Bleeker	1	AMS	10/11
Rhynchobdella aculeata (Bloch)	1	AMS	9
BALISTIDAE—Triggerfishes			
Balistes capriscus Gmelin	4	RHO	9
B. vetula Linnaeus	1	PHIL	5/1
LAGOCEPHALIDAE—Puffers			
Arothron reticularis (Bloch & Schneider)	1	MON	7/1
TETRAODONTIDAE—Puffers			
Amblyrhynchotes honckenii (Bloch)	1	LON(F)	5/5
Tetraodon lineatus (Linnaeus)	2	CHAR	9/3
T. fluviatilis (Hamilton-Buchanan)	3	CHAR	9/3
CANTHIGASTERIDAE—Puffers			
Canthigaster margaritatus Rüppell	1	LON(F)	6/11
DIODONTIDAE—Porcupinefishes			
Diodon hystrix (Linnaeus)	1	PHIL	7/4
BATRACHOIDAE—Toadfishes			
Opsanus tau (Linnaeus)	3	CHI	13/11

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